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DOI:

[10.1093/qjmed/hcy153](https://doi.org/10.1093/qjmed/hcy153)

*Document Version*

Peer reviewed version

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*Citation for published version (APA):*

Roderick, E., Penney, J., Murrells, T., Dargan, P. I., & Norman, I. J. (2018). Epidemiology of adolescent substance use in Norfolk schools. *QJM*, 111(10), 699-706. <https://doi.org/10.1093/qjmed/hcy153>

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*Citation for published version (APA):*

Bino, M., Lefebvre, W., Walton, H., Dajnak, D., Janssen, S., Williams, M., ... Beevers, S. (2017). Sensitivity analyses regarding no<sub>2</sub> exposure assessment and health impacts at a european scale. DOI: 10.1093/qjmed/hcy153

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# Epidemiology of adolescent substance use in Norfolk schools.

E. Roderick <sup>1</sup>, J. Penney <sup>1</sup>, T. Murrells <sup>1</sup>, P. Dargan <sup>2,3</sup> and I. Norman <sup>1</sup>.

From the <sup>1</sup>Florence Nightingale Faculty of Nursing & Midwifery, King's College London, London, UK, <sup>2</sup>Guy's and St Thomas' NHS Foundation Trust and King's Health Partners, Clinical Toxicology, London, UK and <sup>3</sup>Faculty of Life Sciences and Medicine, King's College London, London, UK.

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## Summary

**Background:** The pattern of alcohol and substance use is changing, with the introduction of novel psychoactive substances, the internet as a means of acquisition and variations in drug purity and price. Alcohol and substance use among adolescents is associated with behavioural, mental health, health and social difficulties; arising at a vulnerable period in their development. Little is known about adolescent substance use in the UK, especially in rural areas. **Aim:** To investigate the prevalence of substance use amongst young people, aged 16 -21 years, in Norfolk schools. **Design:** Cross sectional questionnaire survey. **Method:** Pupils from two sixth form colleges in Norfolk answered a self-report questionnaire designed to measure prevalence, age of onset and frequency of use for alcohol, tobacco, illicit substances including new psychoactive substances, as well as demographic data. **Results:** 482 students completed the survey (68% participation rate). Life-time use of alcohol was reported by 442 (91.7%) students and over half the pupils had tried tobacco (52.5%, n=253). 40.7% reported cannabis use and nearly one fifth (18.9%, n=91) reported using 3 4-methylenedioxymethamphetamine (MDMA). 41.1% (n=198) students reported using 'any drug' and 23.2% (n=112) 'using an illicit drug other than cannabis'. 8.7% (n=42) reported the use of a novel psychoactive substance. **Conclusion:** The most widely used substances were alcohol, tobaccos and cannabis; in keeping with European trends. Over the past decade a decline in alcohol and drug use by adolescents has been seen in the UK. However, since 2010 this decline has slowed with an increase in substance use noted in the past two years. This study provides evidence to support this trend. The findings demonstrate differences between the use of substances by pupils in this Norfolk sample compared to national surveys and more urbanised areas. These regional differences can be used to assist the development of local interventions targeting substance use among adolescents.

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## Introduction

The European Monitoring Centre for Drugs and Drug Addiction report that one in four young European's aged 15 to 34 years have tried an illicit drug [1](#) with the UK having the highest prevalence for the Class A drugs cocaine and MDMA in Europe [2](#). Illegal drug use continues to be one of the most significant public health challenges in the UK. This is compounded by the continually evolving drug climate. Whilst drugs such as cannabis and cocaine remain the most widely used drugs [1,3](#) ; since the mid 2000s New Psychoactive Substances (NPS) colloquially known as 'legal highs' have appeared on the market [1,4](#). These drugs are potentially harmful [1,5](#) and in the UK the Psychoactive Substance Act makes it illegal to supply NPSs [6](#). However, attempts to control their use is hampered by their rapid production and appearance of an ever increasing variety of new substances [4,5](#).

The two largest categories of NPS, cathinones and synthetic cannabinoids [1](#) are most commonly used [7-10](#). In 2014, 60% of NPS seizures in Europe were synthetic cannabinoids. As of 2015, 160 synthetic cannabinoids had been identified and these are the largest drug group monitored by EMCDDA's EU Early Warning System [11](#).

Rates of drug use are higher among young people compared to older people and particularly high among adolescents [3,12](#). Adolescence is a particularly vulnerable time to be using substances because young adults are still developing mentally and physically. Adolescents are trying substances for the first time, being unaware of how their body will respond. This can result in them increasing overdose risk by using higher doses, mixing substances and engaging in high risk behaviours including high risk sexual behaviours. Early and frequent substance use has been shown to impact upon physical health, mental well-being, behaviour and educational achievement [13-17](#). Research demonstrates a positive correlation between substance use, in particular cannabis and alcohol, with later mental health difficulties such as psychosis, depression and dependence syndromes [18, 24](#). In 2016 the UK had highest rate of NPS purchases [7](#). NPS use has been observed to cause periods of acute psychosis [25,26](#) in addition to tripling the likelihood of needing emergency medical treatment [7](#).

Research into adolescent drug use in the UK has focused predominantly on urban samples who have different life experiences to young people who grow up in rural areas. Living in a rural location was once thought to be a protective factor against substance misuse due to being geographically removed from factors supportive of drug use such as availability and crime [27](#). Some studies report marked differences in the prevalence of drug and alcohol use between rural and urban areas, as well as, differences in the prevalence of mental disorders [28,29](#). Substance use may be more challenging to address in rural communities with fewer resources for prevention and treatment, on top of reduced means of travel. However, rural drug users report having close family/social networks to support helping them to avoid hitting 'rock bottom' [30](#).

The aim of this study was to investigate adolescent's use of alcohol, tobacco, illicit drugs including NPS in two Norfolk schools amongst adolescents aged 16 to 21.

## Method

### ***Research design and data collection tool***

The study was conducted as cross sectional survey using a self-report questionnaire developed by Penny *et al.* (2015) 31. The data gathered included (i) demographics (age, gender, ethnicity); (ii) whether the student had heard of alcohol, tobacco and a range of 18 recreational drugs and NPS; (iii) life-time/last-month use of alcohol, tobacco and these drugs; (iv) age of onset of first using substances; (v) whether the respondent reported binge drinking (more than 6 units for females or 8 units males in a single session (Office of National Statistics, 2015); (vi) if drug use was reported the source of the drug(s).

### ***Sample and research sites***

Purposive sampling was used to identify four non-selective state schools in Norfolk, which included students from different socioeconomic groups and spanned the county. The head teachers were invited to participate in the study and two agreed to do so. School 1 was a large sixth form college in Norwich (a small city with a population of 132,000) with both and urban and rural intake from across the county. School 2 was a sixth form attached to a high school in a rural area on the coast. Year 12 and 13 were surveyed in these schools, with pupils aging from 16–21 years, completing A-levels. Both schools were predominantly white (92.1%) in ethnicity.

### ***Data collection procedure***

One member of the researcher team (ER) distributed the questionnaires in person to students in class and remained with the students whilst they were completed. Each participant was given a study information sheet to decide if they wished to participate and was able to contact the researcher after receiving the questionnaire if needed. Questionnaires were completed anonymously and placed in a sealed box following completion.

### ***Data analysis***

Data were analysed using SPSS Version-20. Data from the two schools were pooled to provide a sample of Year 12 (16-17 years) and Year 13 (17–21 years) students. Findings are reported as frequencies and percentage prevalence. The chi-squared test of association was used to examine relationships between two independent categorical/ordinal variables. A multivariable logistic regression model was used to identify which variables from the survey influenced reported substance use. The independent variables included in the model were: school, gender, year group, alcohol used, SDQ subscale scores (emotional problems, conduct problems, hyperactivity, peer problems, prosocial behaviour) and ethnicity (BME or white ethnicity). Cox & Snell  $R^2$ , Nagelkerke  $R^2$  and percent concordance were used to assess model of fit.

### ***Ethical approval***

The research was approved by the King's College University Research Ethics Committee (reference: **PNM/14/15-126**).

## Results

### *Sample and response rate*

A total of 655 students were invited to participate and 482 valid questionnaires completed, a response rate of 73.6%. In School 1, 7 pupils (1.4%) declined to participate and 81 (16.7%) students were absent from school on the day of study. In School 2, the survey was distributed during a sixth form assembly, not allowing for absentees to be recorded.

Respondents comprised of 169 males (35.1%) and 304 females (63.1%), with one participant identifying as transgender (0.2%). Eight participants did not record their gender (1.7%). Most pupils were in academic Year 12 (n=313, 65%). The most common ages were 17 years (40.3%) and 16 years (38.2%), followed by 18 years (16.2%) and 19-21 years (3.9%). The ethnic breakdown was predominantly White British n = 417 (86.5%) with all other ethnicities observed in smaller percentages. It was therefore decided to refine the ethnicity groupings to 'white' (n=444, 92.1%) and 'black and minority ethnic' (BME) (n=37, 7.7%) and investigate variations between these two broad groupings.

Table 1: Demographics of the Norfolk respondents

	<b>School 1 N (%)</b>	<b>School 2 N (%)</b>	<b>Total N (%)</b>
<b>Gender</b>			
Male	132 (33.2%)	37 (43.5%)	169 (35.1%)
Female	257 (64.7%)	47 (55.3%)	304 (63.1%)
Transgender	1 (0.3%)	0 (0.0%)	1 (0.2%)
Missing	7 (1.8%)	1 (1.2%)	8 (1.7%)
<b>Year Group</b>			
Year 12	244 (61.5%)	69 (81.2%)	313 (65.0%)
Year 13	130 (32.7%)	16 (18.8%)	146 (30.3%)
Missing	23 (5.8%)	0 (0.0%)	23 (4.7%)
Total	397 (100%)	85 (100%)	482 (100%)
<b>Ethnicity</b>			
White British	338 (85.1%)	79 (92.9%)	417 (86.5%)
Other white	22 (5.5%)	5 (5.9%)	27 (5.6%)
BME	36 (9.1%)	1 (1.2%)	37 (7.7%)
Missing	1 (0.3%)	0 (0.0%)	1 (0.2%)
Total	397 (100%)	85 (100%)	482 (100%)
<b>Age</b>			
16	127 (32.0%)	57 (67.1%)	184 (38.2%)
17	167 (42.1%)	27 (31.8%)	194 (40.3%)
18	77 (19.4%)	1 (1.2%)	78 (16.2%)
19	12 (3.0%)	0 (0.0%)	12 (2.5%)
20	5 (1.3%)	0 (0.0%)	5 (1.0%)
21	2 (0.5%)	0 (0.0%)	2 (0.4%)
Missing	7 (1.8%)	0 (0.0%)	7 (1.5%)
Total	397 (100%)	85 (100%)	482 (100%)

**Alcohol use**

A total of 442 (91.7%) reported lifetime use of alcohol. This increased slightly with age with Year 13 pupils reporting 93.2% use compared to 91.1% in Year 12. There were no gender differences in lifetime use of alcohol between males (91.1%) and females (91.8%). Use was higher in white (n=412, 92.8%) than in non-white students (n=29, 78.4%).

A total of 475 (98.5%) respondents answered the question about binge drinking (>6 units for females, > 8 units for males). 30.9% (n=149) reported that they never binge drink. Of those who reported binge drinking, 41.3% (n=199) reported binge drinking less than once a month, 12.2% (n=59) monthly, 11.4% (n=55) weekly and 2.7% (n=13) daily.

Only 8.7% (n=6) of 16 year old males reported not drinking compared to 22.7% (n=25) of females. Across all ages more males reported drinking in excess of 10+ units in a single drinking session than females (n= 45, 26.8% vs. n=51, 17.2%). More males were also drinking on a weekly basis (n=23, 13.7% vs. n=28, 9.5%) or nearly daily (n=7, 4.2% vs. n=7, 2.4%) compared to females. Yet interestingly more 18 year old males reported abstinence than females (n=8, 25.0% vs. n=2, 4.4%).

**Tobacco use**

A total of 253 (52.5%) respondents reported lifetime tobacco use. Females reported a slightly higher lifetime use (53.3%) than males (51.5%). Year 13 pupils were more likely to have tried tobacco than year 12 students (56.2% vs. 50.2%). Lifetime tobacco use was more common amongst non-white (56.8%) than white (52.9%) students.

**Familiarity with drugs and NPS**

As shown in Table 2, the drugs most commonly heard of (excluding alcohol and tobacco) were cannabis (99.6%), ecstasy (97.7%), heroin (97.7%), crack cocaine (97.1%) and mushrooms (96.3%). The least well-known drugs were gamma-hydroxybutyrate (GHB)/gamma-butyrolactone (GBL) (33.0%), khat (38.4%), methoxetamine (43.8%) and spice (47.7%).

Table 2 Familiarity with alcohol, tobacco and drugs by gender, age and ethnicity

'Have you heard of...'	Male n=169 35.1%	Female n= 304 63.1%	Year 12 n = 313 65.0%	Year 13 n= 146 30.3%	'White' n=444 92.1%	'BME' N=37 7.9%
Alcohol	168 (99.4%)	304 (100.0%)	313 (100.0%)	145 (99.3%)	443 (99.8%)	37 (100.0%)
Tobacco	168 (99.4%)	303 (99.7%)	312 (99.7%)	145 (99.3%)	443 (99.8%)	37 (100.0%)
Cannabis	168 (99.4%)	303 (99.7%)	313 (100.0%)	144 (98.6%)	442 (99.6%)	37 (100.0%)
Ecstasy	164 (97.0%)	299 (98.4%)	303 (96.8%)	145 (99.3%)	437 (98.4%)	33 (89.2%)
Heroin	164 (97.0%)	299 (98.4%)	305 (97.4%)	143 (97.9%)	437 (98.4%)	33 (89.2%)
Crack	163 (96.4%)	297 (97.7%)	304 (97.1%)	142 (97.3%)	433 (97.5%)	34 (91.9%)
Mushrooms	162 (95.9%)	294 (96.7%)	299 (95.5%)	143 (97.9%)	430 (96.9%)	33 (89.2%)
Acid	165 (97.6%)	289 (95.1%)	298 (95.2%)	141 (96.6%)	427 (96.2%)	34 (91.9%)
Cocaine	162 (95.9%)	292 (96.1%)	300 (95.8%)	139 (95.2%)	427 (96.2%)	34 (91.9%)
Speed	157 (92.9%)	289 (95.1%)	289 (92.3%)	143 (97.9%)	420 (94.6%)	33 (89.2%)
Ketamine	159 (94.1%)	277 (91.1%)	285 (91.1%)	137 (93.8%)	416 (93.7%)	27 (73.0%)
Crystallmeth	156 (92.3%)	266 (87.5%)	272 (86.9%)	136 (93.2%)	398 (89.6%)	30 (81.1%)
Solvents	141 (83.4%)	244 (80.3%)	245 (78.3%)	127 (87.0%)	367 (82.7%)	24 (64.9%)
MDMA	136 (80.5%)	223 (73.4%)	228 (72.8%)	119 (81.5%)	342 (77.1%)	24 (64.9%)
Mephedrone	128 (75.7%)	221 (72.7%)	220 (70.3%)	114 (78.1%)	332 (74.8%)	23 (62.2%)
Poppers	119 (70.4%)	184 (60.5%)	187 (59.7%)	105 (71.9%)	287 (64.6%)	21 (56.8%)
Spice	83 (49.1%)	143 (47.0%)	147 (47.0%)	72 (49.3%)	216 (48.7%)	15 (40.5%)
Methoxetamine	77 (45.6%)	130 (42.8%)	133 (42.5%)	66 (45.2%)	197 (44.3%)	15 (40.5%)
Khat	73 (43.2%)	107 (35.2%)	127 (40.6%)	47 (32.2%)	175 (39.4%)	13 (35.1%)
GHB	55 (32.5%)	102 (33.6%)	97 (31.0%)	54 (37.0%)	149 (33.6%)	13 (35.1%)

### Drug use

A total of 198 students (58.9%) reported lifetime drug use. Cannabis was the most commonly used drug (n=198, 41.7 %), followed by MDMA (n =91, 18.9%) and speed (n =48, 10%). As shown in Table 3, reported lifetime prevalence of the use of cannabis and other drugs increased with school year. Overall, 23.2% (n=112) reported use of an illicit drug other than cannabis. The prevalence of cannabis use was higher among white respondents (n =185, 50.7%) than non-white pupils (n=11, 29.7%). There were no gender differences in use of cannabis (40.8% vs. 40.8%). However, the use of 'any illicit drug' was slightly higher in males than females (43.2% vs. 40.1%) and males also reported higher use of 'any drug other than cannabis' than females (27.2% vs. 21.7%).

The number of respondents reporting NPS use was 8.7% (n=42), which made this one of the Norfolk pupils' top 10 most used drug groups. The most commonly used NPS were Mephedrone (n= 31, 6.4%), synthetic cannabinoid receptor agonists ('Spice') (n = 21, 4.4%), and methoxetamine (n= 4, 0.8%). In response to the question which asked respondents if they had taken any drugs not listed in the survey, the most frequently reported additional drugs used were NPS and 'legal highs'. Unfortunately, these could not be incorporated into the data set due to broad descriptions e.g. 'legal highs'.

Amongst students reporting life-time drug use (n=198), the most common source of supply was from a friend (n=149, 30.9%) followed by a dealer (n=104, 21.6%) a shop (n=55, 11.2%) and family member (n=33, 6.6%); use of the internet for supply was less common (n=12, 2.5%).



Table 3, Prevalence of overall substance use, by gender and age.

Overall ranking 'have you ever used...'	Substance	Overall totals	Male N=169	Female N=304	Year 12 N=313	Year 13 N=146
1	Alcohol	442 (91.7%)	154 (91.1%)	279 (91.8%)	285 (91.1%)	136 (93.2%)
2	Tobacco	253 (52.5%)	87 (51.5%)	162 (53.3%)	157 (50.2%)	82 (56.2%)
3	Cannabis	196 (40.7%)	69 (40.8%)	124 (40.8%)	120 (38.7%)	64 (43.8%)
4	MDMA	91 (18.9%)	37 (21.9%)	54 (17.8%)	54 (17.3%)	31 (21.2%)
5	Speed	48 (10%)	22 (13.0%)	26 (8.6%)	29 (9.3%)	15 (10.3%)
6	Ecstasy	47 (9.8%)	26 (15.4%)	21 (6.9%)	21 (8.6%)	16 (11.0%)
7	Cocaine	43 (8.9%)	18 (10.7%)	25 (8.2%)	23 (7.3%)	17 (11.6%)
8	Poppers	36 (7.5%)	23 (13.6%)	13 (4.3%)	23(7.3%)	12 (8.2%)
9	Acid	35 (7.3%)	16 (9.5%)	19 (6.3%)	22 (7.0%)	11 (7.5%)
10	Ketamine	34 (7.1%)	18 (10.7%)	16 (5.3%)	16 (5.1%)	16 (11.0%)
11	Mephedrone	31 (6.4%)	15 (8.9%)	16 (5.3%)	18 (5.8%)	11 (7.5%)
12	Mushrooms	26 (5.4%)	13 (7.7%)	14 (4.3%)	16 (5.1%)	8 (5.5%)
13	Spice	21 (4.4%)	12 (7.1%)	9 (3.0%)	10 (3.2%)	8 (5.5%)
14	Solvents	14 (2.9%)	8 (4.7%)	6 (2.0%)	9 (2.9%)	4 (2.7%)
15	Crystallmeth	9 (1.9%)	5 (3.0%)	4 (1.3%)	7 (2.2%)	1 (0.7%)
16	Crack	6 (1.2%)	3 (1.8%)	3 (1.0%)	4 (1.3%)	2 (1.4%)
17	Heroin	5 (1.0%)	2 (1.2%)	3 (1.0%)	4 (1.3%)	1 (0.7%)
18	Methoxetamine	4 (0.8%)	1 (0.6%)	3 (1.0%)	3 (1.0%)	1 (0.7%)
19	Khat	3 (0.6%)	2 (1.2%)	1 (0.3%)	3 (1.0%)	2 (1.4%)
20	GHB	3 (0.6%)	1 (0.6%)	2 (0.7%)	2 (0.6%)	1 (0.7%)
	Any drug	198 (41.1%)	73 (43.2%)	122 (40.1%)	124 (39.6%)	63 (43.2%)
	Any drug other than cannabis	112 (23.2%)	46 (27.2%)	66 (21.7%)	68 (21.7%)	37 (25.3%)
	NPS *	42 (8.7%)	19 (11.2%)	23 (7.6%)	23 (7.3%)	16 (11.0%)

\*NPS = Spice, Mephedrone and Methoxetamine

### Influences on drug use

Few differences were observed in overall substance use by individual schools, except that students in School 1 reported higher levels of NPS use than in School 2 (9.8% vs. 3.5%). There was some gender variation within the schools, with School 2 females reported lower illicit substance use than males (31.9 % vs.45.9%) whereas this was not significant in School 1 (41.6% vs. 42.4%). For 'any drug used excluding cannabis' females reported lower use than males in both schools, although usage remained higher in School 1 compared to School 2 (23.7% vs. 10.6%). Prevalence was similar for males in both schools (27.3% vs. 27.0%).

The fit of the overall multivariable logistic regression model was statistically significant  $\chi^2$  (with 11 degrees of freedom) = 56.11,  $p < .001$ , indicating that the model was able to differentiate to some degree between pupils who reported and did not report substance use. The Cox Snell  $R^2$  was 11.3% and Nagelkerke  $R^2$  was 15.2%. The model correctly classified 65.2% cases and accurately predicted 82% of non-users and 41% of users. The odds ratios and 95% confidence intervals estimated from the model are shown in Table 4. Both use of alcohol and conduct problems were associated with reported drug use.

Table 4: Multivariable logistic regression model for reported drug use

Variable	Odds ratio(95% CI)	p
<b>School</b>		
School 1	1.00 (-)	
School 2	0.79 (0.46-1.36)	.40
<b>Gender</b>		
Male	1.00 (-)	
Female	1.00 (0.63-1.57)	.99
<b>Year group</b> (Wald $\chi^2 = 1.13$ , 2df, p=.57)		
12	1.00 (-)	
13	1.02 (0.66-1.58)	.92
Unknown	1.71 (0.63-4.64)	.29
<b>Alcohol used</b>		
No	1.00 (-)	
Yes	7.22 (2.14-24.32)	.001
<b>SDQ</b>		
Emotional problems	0.95 (0.87-1.04)	.29
Conduct problems	1.32 (1.14-1.53)	<.001
Hyperactivity	1.06 (0.96-1.17)	.22
Peer problems	0.89 (0.79-1.01)	.075
Prosocial behaviour	0.99 (0.89-1.11)	.92
<b>Ethnicity</b>		
BME	1.00 (-)	
White ethnicity	1.63 (0.74-3.62)	.23

## Discussion

There are few studies addressing substance use by adolescents in the UK and no previous known studies in Norfolk. This section discusses the findings of the study compared to wider research literature and data from London schools where the same self-report questionnaire was distributed.

### Alcohol

Among Norfolk student's the most used substance was alcohol, with 91.7% having tried it. The European School Survey Project on Alcohol and Drugs (ESPAD) [2](#) survey reported 90% prevalence, similar to those in this study. Norfolk adolescents reported a significantly higher prevalence than adolescents in Penney's London sample where 47.8% had used alcohol [31](#). This may be due to the cultural and religious diversity in London. Variations in substance use

have been attributed to stronger familial relationships and faith within ethnic minorities and peer influences and school cultures being more influential upon white than non-white individuals [32-35](#). These findings are supported in the English Smoking, Drinking and Drug use survey (SDD) [36](#), who observed lowest drinking rates in London. Interestingly, when looking at white students in both Norfolk and London, Norfolk students continued to report higher alcohol use than in London (92.8% vs. 79.7%). Alcohol was a strong predictor of other substance use. Alcohol has been described as a 'gateway drug' leading to higher levels of licit and illicit substance use [37](#).

### ***Tobacco***

In this study 52.5% of pupils reported lifetime smoking. This is higher than national prevalence which ranges from 24% - 47% [2,15,36](#). A lower proportion of pupils in Norfolk reported tobacco use compared to those in Penney's London study where there was a 69.1% reported prevalence [31](#). Findings from this and Penney's London study are at odds with the perceived decline in smoking in England since the mid-1990's [2](#). The health and wellbeing 'What About Youth' survey [38](#) noted a gender difference in tobacco use with girls being more likely than boys to have smoked (28% vs. 21%); this was subtly seen among Norfolk pupils (53.3% vs. 51.5% respectively). This possibly indicates that smoking is more of a cultural norm in Norfolk, with fewer gender barriers. Norfolk students' rates of tobacco use increased with age, a pattern supported by the SDD, ESPAD and WAY surveys.

### ***Illicit drug use***

41.1% of students in Norfolk said they had used 'any drug'. This is higher than figures collected by the EMCDDA (2016) reporting 36.5% use of 'any illegal drug' by 15-24 year olds, the ESPAD survey (24%), Penney's London study (20.4%) and the SDD survey of 11-15 year olds (15%). When comparing white students' from this study to white students in the London study who completed the same questionnaire, Norfolk students' use continued to be higher (42.1% vs. 25.3%). These findings go against the overall pattern of decreasing substance use. It supports the recent trend of substance use increasing over the past few years; with the Crime Survey for England and Wales (2015) [3](#) reporting illicit drug use rose from 16.4% in 2012/13 to 19.4% in 2014/15. The higher prevalence in Norfolk may result from the schools' culture towards substance use, normalisation and peers attitudes [39-41](#). The WAY survey found the lowest score on the Warwick-Edinburgh Mental Well-Being Scale [42](#) for 'life satisfaction' was in the East of England. Poor mental well-being increases the likelihood of using substances under the self-medication theory. These findings also support the claim that substance use is more prevalent in rural areas than urban settings [43-46](#).

Cannabis was the most commonly used illicit drug, with 41.7% of Norfolk adolescents reporting lifetime use, this is in keeping with the European and UK figures [1,12,31,47](#). However, rates of use in Norfolk were considerably higher than reported elsewhere; ESPAD (25%), Penney et al. (17.4%), SDD (18.7%) and WAY (11%). When comparing white respondents in this and Penney's London study, Norfolk students reported use remained significantly higher (50.7% vs. 20.3%). No variation was seen between males and females for cannabis use. This contrasts with findings from European surveys which find that males were twice as likely as females to report use of cannabis and exhibit more intensive and regular use [1](#).

Use of 'any drug other than cannabis' was reported by 23.2% of Norfolk adolescents. The most commonly used drugs after Cannabis were MDMA (18.9%), Speed (10.0%) and Ecstasy (9.8%). Reports of 'other' drug use were not shown for the UK in ESPAD (2015) key findings, yet, ecstasy and amphetamines were joint second across Europe. Regional preferences were observed amongst commonly used drugs other than cannabis. The SDD reported solvents being the most used substance after cannabis, with prevalence of other substance use being low [36](#), where as in the London study magic mushrooms and amphetamines were more prevalent. In the London study [31](#) only 6.9% reported trying any 'drug other than cannabis' highlighting the volume reported in this study.

18.9% of Norfolk pupils had used MDMA. This is a much higher prevalence than the 10.2% use reported by EMCDDA (2014); the 5.4% use by 16-24 year old in the CSEW (2014/15); or the 0.9% prevalence in Penney's London survey [31](#).

The use of NPS was reported by 8.7% of Norfolk respondents. This is considerably higher than the national average of 2.8% [3](#) and the 1.1% prevalence in Penney's London study [31](#). The most common NPS in Norfolk was Spice (4.4%). Norfolk student's reported a higher use of Mephedrone (6.4 %), compared to the SDD survey (1.3%), which also did not ask about other NPS use, and Mephedrone use in the London study (0.5%) [31](#). Therefore this study supports the rise in NPS use across Europe [1](#) and highlights the existence of regional differences.

### **Factors associated with substance use**

Identifying factors linked to drug use promotes a greater understanding of potential influences that could help shape preventative interventions. This study identified demographic factors associated with drug and alcohol use.

#### ***Age***

Substance use was seen to increase incrementally with age, supported by the SDD, ESPAD and the London study [2](#), [12](#), [31](#). Key ages for trying substances in the Norfolk sample were between 12-16 years for alcohol, tobacco and cannabis and 14-18 years for MDMA. It has been noted that alcohol use at 11-14 years heightens the risk of developing of alcohol disorders [48](#). Research shows that progression of drug use usually begins with a legal substance, with early alcohol use being a strong factor in later illegal drug use [37](#).

#### ***Ethnicity***

A high percentage of Norfolk adolescents reported lifetime alcohol use, whereas a comparatively low percentage of London students reported alcohol use. Factors which could lead to this difference may include ethnicity, culture, and religion. Stronger familial ties have been seen to influence BME adolescents, with peer influences having a stronger affect upon white respondents [49](#).

Tobacco use was reported less in Norfolk than by adolescents in Penney's London [31](#). A higher tobacco use was also evident amongst BME pupils in Norfolk (56.8% vs 52.9%) which was also seen the London study.

## **Gender**

Only marginal gender differences were seen between the ages of onset for substances, except for MDMA among Norfolk adolescents. Conversely, going against the trend of males being more likely to try illegal substances, it was females who showed a higher uptake of MDMA at age 15 (31.4%, n=16 vs. 10.8%, n=4).

## **Drug source**

The most frequently reported method of obtaining illicit substances was from a friend (30.9%), followed by a dealer (21.6%), shop (11.2%) and over the internet (2.5%). This supports findings from the CSEW (2015) [3](#) and reflects the trend seen among white respondents in Penney et al.'s (2016) London study [31](#). Whereas, Black and Asian respondents' in London primarily sourced substances from a dealer or shop respectively [31](#). Male students were nearly twice as likely to obtain drugs from a shop and were slightly more likely to use a dealer or the internet compared to female peers. Norfolk pupils reported slightly higher rates of obtaining drugs over the internet (2.5%), in comparison to 1% in the CSEW (2014) and 0.5% in Penney et al.'s London study. Use of the internet as a means of acquisition may be less than other sources as it is believed such websites are predominantly used by people in their 20-30s [50](#). The low use of 'head shops' could be attributed to not wanting a 'drug user identity' as reported by some Mephedrone users [51](#). Since this study was conducted, The Psychoactive Substances Act was introduced in 2016, making it illegal for these shops to exist, pushing their sales underground. As a result, NPS sourcing may increase over the dark web [52](#) and users may become more reliant on drug dealers.

## **Limitations**

The sample was limited to 482 respondents and included just two schools. The sample also included only sixth form student's studying for A-levels. Data collection was limited to students present on the day of sampling, since teachers did not want questionnaires to be sent to students' homes. From conversations with teachers, some of the truanting students were known to have substance misuse problems and therefore the reported use of substances in this sample may be an underestimate.

The sample was predominantly white which made comparison with other ethnicities unreliable. From the 2011 census 92.4% of Norfolk inhabitants were 'white British' making the sample representative, however, recent figures may have changed because of EU migration into the local agricultural workforce.

The multivariable model only accurately predicted drug use in 65% of cases. It was better at predicting non-users than users. There may be an element of reverse causality in the model with behavioural problems being caused by drug use.

There are also limitations in drawing comparisons between this data set, collected in 2016, and those from other research carried out at different times. This is due to the rapidly changing drug scape as well as changes in educational legislation passed in 2015 by the

Department of Education, with young people now remaining in educational/vocational work until the age of 18 years. Research conducted before 2015 may have samples which are over represented by those wanting to remain in education.

Some respondents gave descriptive answers rather than the numerical ones, for example stating they used 'loads' of a substance. These data could not be included and therefore this may have caused under reporting actual prevalence.

Other factors not captured in this study, such as personal motivation, schools culture and peer attitudes 41. If a culture of substance use exists, exposure to drug use will be common and perhaps socially desirable.

## Conclusion

This study showed that alcohol and tobacco were the most used drugs by Norfolk adolescents. Cannabis was the most frequently tried illicit drug, which is in keeping with European and national figures. Overall, 41.1% of Norfolk student's reported 'any drug' use, which was higher than national reported prevalence. The three most used substances after cannabis in this study were MDMA, speed and ecstasy. They differed from those identified in other research, highlighting regional difference. Use of NPS within the Norfolk sample (8.7%) is higher than the national average (2.8%) 3. This study supports the findings that rural drug use is equal to and can surpass that of urban drug use. It is additionally supportive of a rise in drug use over the past few years 1,3. However, reasons leading to or associated with substance use are not as simple as 'rural' and 'urban', with no rural or urban area being homogenous 53. Causal reasons for drug use are multifaceted, including socioeconomic factors, accessibility, cultural influences, religion and varying health provisions. Nevertheless, continuing to research adolescent substance use by is vital in highlighting recent prevalence trends, identifying the most at risk groups and regional differences. This information can be used to inform and shape preventative interventions, policy and tailor resources national and locally to meet the target populations need.

Conflict of interest: None declared.

The lead author affirms that this manuscript is an honest, accurate, and transparent account of the study being reported; that no important aspects of the study have been omitted; and that any discrepancies from the study as planned (and, if relevant, registered) have been explained.

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